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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CHRISTENSEN, SCOTT B	
ART UNIT	PAPER NUMBER
2444	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/731,572	BIRD ET AL.	
	Examiner	Art Unit	
	Scott Christensen	2444	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *34-67* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *34-67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in regards to the most recent papers filed on 5/20/2009.

Response to Arguments

2. Applicant's arguments filed 5/20/2009 have been fully considered but they are not persuasive.

3. On pages 9-10, Applicant argues the rejection of the instant claims under 35 USC 103. More specifically, Applicant argues "Encapsulation in an object-oriented programming sense is not the same thing as, and in fact has nothing to do with, encapsulation in a data network communication sense" meaning that the teachings of Colson would be inapplicable to the teachings of Hao.

However, the encapsulation of Colson is utilized to encapsulate a certain type of data (JavaBeans) into a type of message that does not normally support the type of data. Within the rejection, as presented below, the teachings that encapsulating messages of one type into a CAN protocol message is well known.

It is noted that the test for obviousness is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, the idea of encapsulating a message of one protocol into a message of another protocol is well known, as stated in the rejection below, and not contended by Applicant. The well known nature encapsulating an IP protocol message into a message of another type can be seen by looking at how IP protocol messages are transmitted over Ethernet. For example, in US

2002/0124095 to Sultan, it is disclosed that Ethernet accepts messages formatted by higher level protocols, such as IP, and encapsulates it for delivery across the Ethernet network (Sultan: Paragraph [0002]).

The question is, however, would a person of ordinary skill in the art have looked at doing the encapsulation of a message into a CAN protocol message. As shown by Colson, encapsulation of messages of a certain type in a CAN protocol message was well known. By taking the exact teaching of how a message is transmitted across other networks, such as an Ethernet network, as well known by a person of ordinary skill in the art, and applying this to the teaching that messages transmitted across a CAN protocol network may be encapsulated in the CAN protocol message, it is clear that a person of ordinary skill in the art would have pursued applying the knowledge of encapsulating IP messages into messages of other protocols to a CAN network, such as that of Hao, for the purpose of expanding the capabilities of the CAN network to allow for Internet communications, as detailed in the rejection below.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 34-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hao in US 6,510,479, hereafter referred to as "Hao" in view of Colson et al. in US 6,574,734, hereafter referred to as "Colson."

With regard to claims 34 and 61-62, Hao discloses a method comprising:

communicating information between hosts over a controller area network (CAN) bus within a vehicle (Hao in col 2, lines 44-55).

Hao does not disclose expressly that the communication is performed by encapsulating a packet in a CAN protocol message.

However, Colson discloses that a Java object can be encapsulated to an automotive bus architecture, where an automotive bus architecture may be a Controller Area Network (CAN) (Colson: Column 5, lines 27-39 and Column 6, lines 29-37).

Accordingly, it would have been obvious to encapsulate messages in a CAN message.

The suggestion/motivation for doing so would have been that this would allow functionality that would have not been otherwise possible with the CAN interface to be performed. An example of this would be Internet communications with security features (Colson: Column 2, lines 49-64).

Hao as modified by Colson does not specifically teach that the communication is between Internet protocol (IP) hosts over the CAN bus, and that the encapsulation is of an IP message.

However, Official Notice (See MPEP 2144.03) is taken that encapsulation of IP packets into other types of packets was well known to a person of ordinary skill in the art.

Accordingly, it would have been obvious to utilize IP packets as the message that is being encapsulated in the teachings of Hao as modified by Colson.

The suggestion/motivation for doing so would have been that Colson is concerned with communications over the Internet. Internet communications allows additional functionality to be realized by devices on the CAN bus, such as reporting of conditions to outside entities as well as management functions to be performed by outside entities over the Internet, where the communications over the Internet would be performed through the use of IP packets.

With regard to claims 35 and 49, Hao as modified by Colson teaches using the IP destination address to determine a next-hop IP address (For Internet communications, the IP destination address is always utilized to determine the next-hop IP address, as the entire purpose of having a next-hop is to approach the destination.)

With regard to claims 36 and 50, Hao as modified by Colson teaches determining a CAN bus address based upon the next-hop IP address (When a packet destined for a device on the CAN bus is received, the next-hop IP address would indicate that the IP address of a device on the CAN bus, which would result in the CAN bus address being determined based on the next-hop IP address pointing to a device on the CAN bus.).

With regard to claims 37 and 51, Hao as modified by Colson teaches the invention as substantially claimed except if the next-hop IP address is a broadcast or multi-cast address, a CAN global address is used as the CAN bus address.

However, Official Notice is taken that CAN global addresses were well known in the art, as were multi-cast and broadcast next-hop IP addresses.

Accordingly, it would have been obvious to modify Hao as modified by Colson to use a CAN global address as the CAN bus address if the next-hop IP address is a broadcast or multi-cast address.

The suggestion/motivation for doing so would have been that broadcast and multi-cast addresses in IP indicate that multiple recipients should receive the message. Accordingly, allowing each address at the destination to receive the message would correspond with the intention of utilizing multi-cast and broadcast IP addresses. This functionality would be performed through the utilization of the CAN global address, in order to easily send the message to each device on the CAN bus.

With regard to claims 38 and 52, Hao as modified by Colson teaches that if the next hop IP address is a unicast address, using an address resolution protocol request to determine the CAN bus address (The instant claim provides no requirement as to how the ARP request determines the CAN bus address. Utilizing ARP to determine the location of the next hop as an IP address, then forwarding the packet to the appropriate

CAN device would read on this limitation. Applicant should amend the instant claim to clearly disclose how the ARP request is used to determine the CAN bus address.)

With regard to claims 39, 43, 48, 56 and 59, Hao as modified by Colson teaches the invention as substantially claimed except that using an address resolution protocol request further comprises: transmitting a CAN bus address request message on the CAN bus; and receiving a reply message from one of the IP hosts, including the CAN bus address.

However, Official Notice is taken that it would have been well known in the art to determine an address of a device on the CAN bus by sending a CAN bus address request message on the CAN bus, and receiving a reply which includes the CAN bus address.

Accordingly, it would have been obvious to utilize a CAN bus address request message to determine the CAN bus address of one of the IP hosts.

The suggestion/motivation for doing so would have been that this scheme allows the IP hosts on the CAN bus to be determined. The only other way to perform this functionality would be to have prior knowledge of the location of each IP host on the CAN bus. Utilizing a simple discovery method such as this allows the system to allow for changes in the topology of the devices on the CAN bus.

With regard to claim 40, Hao as modified by Colson teaches:

transmitting the CAN/IP message to the CAN bus address (This is the purpose of the combination of Hao and Colson, to transmit the messages to the destination.); and

receiving the CAN/IP message at a first one of the IP hosts, which corresponds to the CAN bus address (This is the purpose of the combination of Hao and Colson, to receive messages at the destination.).

With regard to claims 41 and 53-54, Hao as modified by Colson teaches the invention as substantially claimed except after receiving the CAN/IP message, authenticating the CAN/IP message as being from a second one of the IP hosts.

However, Official Notice is taken that authenticating the sender of IP packets was well known in the art.

Accordingly, it would have been obvious to authenticate the CAN/IP message after receiving the CAN/IP message.

The suggestion/motivation for doing so would have been that unrestricted access to nodes is dangerous security-wise, as recognized by Colson (Column 2, lines 49-64). As such, having some sort of authentication scheme, whether the scheme includes certificates, white listing, black listing, etc. allows some measure of security to be realized at the recipient.

With regard to claims 42, 55 and 58, Hao as modified by Colson teaches the invention as substantially claimed except that authenticating the CAN/IP message further comprises:

extracting a CAN source address from the CAN/IP message, wherein the CAN source address is associated with the second one of the IP hosts; and

comparing the CAN source address with known CAN addresses stored in an address resolution protocol (ARP) cache, which stores CAN bus addresses and IP addresses.

However, Official Notice is taken that it would have been well known in the art to cache known addresses, and utilize these known addresses to authenticate messages.

Accordingly, ti would have been obvious to perform the steps of extracting a CAN source address from the CAN/IP message, wherein the CAN source address is associated with the second one of the IP hosts; and comparing the CAN source address with known CAN addresses stored in an address resolution protocol (ARP) cache, which stores CAN bus addresses and IP addresses in the teachings of Hao as modified by Colson.

The suggestion/motivation for doing so would have been that performing a check of the CAN address with respect to known valid CAN addresses (e.g. the ARP cache) restricts access to the host from devices that are not legitimately in the network (e.g. an attacker gained unauthorized access to the network, and is not spoofing another address). This is a relatively simple security scheme that allows certain types of attacks from being prevented.

With regard to claim 44, Hao as modified by Colson teaches determining the CAN/IP message type (When a message is processed, the type of message is

determined. For example, when the CAN message is authenticated, the message is processed, revealing that the CAN message has an IP message encapsulated in it along with any other information associated with the packet.).

With regard to claim 45, Hao as modified by Colson teaches the invention as substantially claimed except that if the CAN/IP message type is an ARP request corresponding to the first one of the IP host's IP address, sending an ARP reply verifying the first one of the IP host's address.

However, the instant claim is rejected for substantially similar rational as provided with respect to claim 39.

With regard to claim 46, Hao as modified by Colson teaches the invention as substantially claimed except that if the CAN/IP message type is an ARP reply to a previously sent ARP request, adding the IP address extracted from the ARP reply to the ARP cache.

However, Official Notice is taken that caches to store addresses of known nodes (e.g. ARP caches) were well known in the art.

Accordingly, it would have been obvious to a person of ordinary skill in the art to add the IP address extracted from the ARP reply to the ARP cache.

The suggestion/motivation for doing so would have been that when network communications occur, typically more than one packet is received, meaning that a plurality of packets would likely need to be routed to a destination. Without providing for

some sort of ARP cache, each and every received packet would result in at least two additional messages, the ARP request and the ARP reply, being broadcast to each node on the CAN bus, resulting in a huge increase in resource requirements of each node as well as the CAN bus itself for each node performing IP communications. Meanwhile, a cache would allow the broadcasts to be halted for at least some period of time, thus drastically reducing bandwidth requirements of the CAN bus as well as processing requirements of each node on the CAN bus.

With regard to claims 47, 57, and 60, Hao as modified by Colson teaches that if the CAN/IP message type is a CAN/IP datagram, extracting and processing the IP message (The purpose of the combination of Hao as modified by Colson is to extract and process IP messages that are received in the CAN/IP packets).

With regard to claim 63, Hao as modified by Colson teaches that a CAN device and said IP host are coupled to the CAN bus (As a CAN bus is utilized, CAN devices are connected to the CAN bus. Further, the combination of Hao and Colson results some of the CAN devices connected to the CAN bus being IP hosts.).

With regard to claim 64, the Hao as modified by Colson teaches that the first IP host is configured to communicate with the second IP host by transmitting the CAN/IP message over the CAN bus (In the combination of Hao and Colson, the IP hosts are

fully capable of communicating with each other, which would be performed by transmitting the messages over the CAN bus.).

With regard to claim 65, the invention claimed is substantially similar to that claimed in claim 63, and is rejected for substantially similar reasons.

With regard to claim 66, Hao as modified by Colson teaches that a result of said encapsulating is a CAN/IP message, which includes an IP destination address (IP messages include an IP destination address, which would result in an IP destination address being included in the CAN/IP message from encapsulating the complete IP message in a CAN message.)

As per claim 67, the invention claimed is substantially similar to that claimed in claim 63, and is rejected for substantially similar reasons.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Christensen whose telephone number is (571)270-1144. The examiner can normally be reached on Monday through Thursday 6:30AM - 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Vaughn can be reached on (571) 272-3922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. C./
Examiner, Art Unit 2444

/Paul H Kang/
Primary Examiner, Art Unit 2444